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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,377	12/10/2004	Takayuki Furuta	043082	4713

38834 7590 11/04/2009
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EXAMINER	
JEN, MINGJEN	

ART UNIT	PAPER NUMBER
3664	

NOTIFICATION DATE	DELIVERY MODE
11/04/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentmail@whda.com

Office Action Summary	Application No.	Applicant(s)
	10/517,377	FURUTA ET AL.
	Examiner	Art Unit
	IAN JEN	3664

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/10/2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/10/2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is response to the communication entered on September 24th, 2009.

2. Claims 1, 5 and 9 has been amended.

3. Claims 1 – 12 are pending in current application.

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takenaka et al (US Pat No 5357433) in view of De Beaucourt et al (US Pat No 5421426) and further in view of Nishikawa et al (US Pat No 5255753).

As for claim 1, Takenaka et al shows a walking mobile system comprising: foot portion (Fig 1, 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), a main body having at both sides of its lower part a plurality of leg portions attached thereto so as to be each pivotally movable biaxially (Fig 1; Col 2, lines 66 - Col 3, liens 21), each of the leg portions having a knee portion

in its midway and a foot portion at its lower end (Fig 1, 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), the foot portions being attached to their corresponding leg portions so as to be pivotally movable biaxially (Fig 1, 18R,18L, 20R, 20L, 22R, 22L; Col 3, lines 10-14), drive means for pivotally moving respective leg, knee, and foot portions (Col 3, lines 1-2 where drive means are electric motors), a gait forming part for forming gait data including target angle path, target angle velocity, and target angle acceleration corresponding to a required motion(Abstract, where gait is generated such that a ZMP kinematically from the motion of the robot) , and a walk controller for drive-controlling the drive means based on the gait data (Fig 1, Control unit 26; Fig 2, CPU 60; Col 4, lines 2-5), characterized in that, the walk controller comprises force sensors for detecting forces applied to soles of respective foot portions (Col 3, lines 35 - 58) , and a compensation part for adjusting the gait data from the gait forming part based on horizontal floor reaction force among the forces detected by the force sensors (Col 4, lines 59- Col 4, lines 9), the force sensors are provided to regions, respectively, divided into a plurality at the soles of respective foot portions (Col 3, lines 44 - 45), the force sensors provided to the regions next to end edges of respective soles detect a contact of foot sides to an obstacle while the foot portion is moved(Col 3, lines 44 - 45), and the compensation part adjusts the gait data from the gait forming part , referring to the contact of foot sides (Fig 2, D/A 66, Servo amplifier, encoder/motor; Col 3, lines 59 - Col 4, lines 9 where the each servo amplifier connects to encoder/motor) and so as to maintain a robot's stability (intended use of gait compensation part). Takenaka et al is silent regarding an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

De Beaucourt et al shows an upper sole and a lower sole (Col 2, lines 3 – 33, lower part 11, upper part 13; See Fig 1); the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion (Col 2, lines 3 – 33, lower part 11, upper part 13; See Fig 1); Nishikawa et al shows the force sensor is provided between the upper sole and the lower sole (Col 6,lines 50- 65; See Fig 2, Upper Surface 62, Lower sole 54, Sensor 50)

It would have been obvious for one of ordinary skill in the art to provide the robot foot structure of De Beaucourt, along with sensor of Nishikawa, in order to provide improved foot bearing action, with improved foot stability, as taught by De Beaucourt and Nishikawa, to Takenaka.

As for claim 2, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and at least a part of a outer edge of the sole as a detection part of the corresponding force sensor (Fig 5; Col 5, lines 40-45), in the region next to the end edges of the respective soles (Fig 5, Col 5, lines 40 - Col 6, lines 35), forms a circular arc plane with the force sensor as the center(Fig 5, Col 5, lines 40 - Col 6, lines 35 where the circular arch plane is the robotic feet with sensor distributed around the feet including center).

As for claim 3, Takenaka et al shows the force sensor is a 3-axis force sensor, and the compensation part comprises a hexaxial force computing part for computing forces in the hexaxial direction based on detected signals from respective force sensors (Fig 4, E0, E1,E2 coordinates, X,Y,Z directions; Col 4 lines 35 - Col 5, lines 43), and a contact detection part for

detecting the contact of a foot side by a decomposition of force components (Fig 5, dx dy; Col 5 4- 34).

As for claim 4, Takenaka et al shows the contact detection part judges if the detected signals from respective force sensors are forces from a floor surface, or by the contact to a matter on the floor surface (Fig 4, Fig 5; Col 5, lines 5 - 35), and outputs flag information as to which force sensor detected the contact of a foot side to the compensation part (Fig 5; Col 1, lines 23 - 40 where convex polygon is distributed by force sensors, which connects to the control unit 26; Col 3, lines 59 - Col 4, lines 10).

As for claim 5, Takenaka et al shows a main body having at both sides of its lower part a plurality of leg portions attached thereto so as to be each pivotally movable biaxially (Fig 1; Col 2, lines 66 - Col 3, liens 21), each of the leg portions having a knee portion in its midway and a foot portion at its lower end (Fig 1, 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), the foot portions being attached to their corresponding leg portions so as to be pivotally movable biaxially (Fig 1, 18R,18L, 20R, 20L, 22R, 22L; Col 3, lines 10-14) , and drive means for pivotally moving respective leg, knee, and foot portions (Col 3, lines 1-2 where drive means are electric motors), the walk controller drive-controls the drive means in accordance with gait data including target angle path, target angle velocity, and target angle acceleration formed from a gait forming part corresponding to a required motion (Abstract, where gait is generated such that a ZMP kinematically from the motion of the robot; Fig 1, Control unit 26; Fig 2, CPU 60; Col 4, lines 2-5), as well as comprises force sensors to detect forces applied to a sole of each foot

portion (Col 3, lines 35 - 45), a compensation part to adjust the gait data from the gait forming part based on horizontal floor reaction force among the forces detected by the force sensor (Fig 2, Fig 4; Col 3, lines 59 - Col 4, lines 40),

the force sensors are provided to regions, respectively, divided into a plurality at the soles of respective foot portions (Fig 2, Fig 4; Col 3, lines 59 - Col 4, lines 40), the force sensors provided to the regions next to end edges of respective soles detect a contact of foot sides sensor to an obstacle while the foot portion is moved(Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55; Fig 5; Col 5, lines 40-45), the compensation part adjusts the gait data from the gait forming part, referring to the contact of foot sides (Fig 2, D/A 66, Servo amplifier, encoder/motor; Col 3, lines 59 - Col 4, lines 9 where the each servo amplifier connects to encoder/motor), so as to maintain robot's stability (intended use of gait compensation part). Takenaka et al is silent regarding an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

De Beaucourt et al shows an upper sole and a lower sole (Col 2, lines 3 – 33, lower part 11, upper part 13; See Fig 1); the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion (Col 2, lines 3 – 33, lower part 11, upper part 13; See Fig 1); Nishikawa et la shows the force sensor is provided between the upper sole and the lower sole (Col 6,lines 50- 65; See Fig 2, Upper Surface 62, Lower sole 54, Sensor 50)

It would have been obvious for one of ordinary skill in the art to provide the robot foot structure of De Beaucourt, along with sensor of Nishikawa, in order to provide improved foot

bearing action, with improved foot stability, as taught by De Beaucourt and Nishikawa, to Takenaka.

As for claim 6, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and at least a part of a outer edge of the sole as a detection part of the corresponding force sensor (Fig 5; Col 5, lines 40-45), in the region next to the end edges of the respective soles (Fig 5, Col 5, lines 40 - Col 6, lines 35), forms a circular arc plane with the force sensor as the center (Fig 5, Col 5, lines 40 - Col 6, lines 35 where the circular arch plane is the robotic feet with sensor distributed around the feet including center). Takenaka et al is silent regarding an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

Yamajima shows an upper sole and a lower sole (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40), and the force sensor is provided between the upper sole and the lower sole (Col 2, lines 5 – Col 3, lines 30; Fig 2, Abstract; where the weight machine is the force sensor), and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion (Fig 1, platform 11 as lower sole, base 13 as upper sole; Col 2, lines 5- 40).

It would have been obvious for one of ordinary skill in the art, to provide the force sensor mechanism, as taught by Yamajima, to Takenaka et al, in order to provide a force detecting means for the force exerted on the robot foot.

As for claim 7, Takenaka et al shows the he force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and the compensation part comprises a hexaxial force computing part for computing forces in the hexaxial direction based on detected signals from respective force sensors (Fig 4, E0, E1,E2 coordinates, X,Y,Z directions; Col 4 lines 35 - Col 5, lines 43), and a contact detection part for detecting the contact of a foot side by a decomposition of force components (Fig 5, dx dy; Col 5 4- 34).

As for claim 8, Takenaka et al shows the contact detection part judges if the detected signals from respective force sensors are forces from a floor surface (Fig 4, Fig 5; Col 5, lines 5 - 35), or by the contact to a matter on the floor surface, and outputs flag information as to which force sensor detected the contact of a foot side to the compensation part (Fig 5; Col 1, lines 23 - 40 where convex polygon is distributed by force sensors, which connects to the control unit 26; Col 3, lines 59 - Col 4, lines 10).

As for claim 9, Takenaka et al shows a walk control method for a walking mobile system comprising a main body having at both sides of its lower part a plurality of leg portions attached thereto so as to be each pivotally movable biaxially (Fig 1; Col 2, lines 66 - Col 3, liens 21; 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), each of the leg portions having a knee portion in its midway and a foot portion at its lower end (Fig 1; Col 2, lines 66 - Col 3, liens 21; 16L, 16R, 22L,22R; Col 2, lines 66 - Col 3, liens 21), the foot portions being attached to their corresponding leg portions so as to be pivotally movable biaxially (Fig 1, 18R,18L, 20R, 20L, 22R, 22L; Col 3, lines 10-14), drive means for pivotally moving respective leg, knee, and foot

portions (Col 3, lines 1-2 where drive means are electric motors), the walk control method including drive-controlling the drive means based on gait data including target angle path, target angle velocity, and target angle acceleration formed from a gait forming part corresponding to a required motion (Abstract, where gait is generated such that a ZMP kinematically from the motion of the robot), as well as detecting forces applied to a sole of each foot portion(Fig 4, Fig 5; Col 3, lines 35 - 58), and also adjusting the gait data from the gait forming part by a compensation part based on horizontal floor reaction force among forces detected by force sensors (Fig 4, Fig 5; Col 4, lines 59- Col 4, lines 9), characterized in that it includes, a first step to detect the forces by respective force sensors in regions divided into a plurality at the soles of respective foot portions (Col 3, lines 44-45), a second step to detect a contact of respective foot sides to an obstacle while the foot portion is moved by detected signals from the force sensors provided to the regions next to end edges of respective soles (Col 3, lines 44-45), and a third step to adjust the gait data from the gait forming part by the compensation part, referring to the contact of foot sides (Fig 2, D/A 66, Servo amplifier, encoder/motor; Col 3, lines 59 - Col 4, lines 9 where the each servo amplifier connects to encoder/motor), so as to maintain a robot's stability (intended use of the gait compensation part). Takenaka et al is silent regarding an upper sole and a lower sole, and the force sensor is provided between the upper sole and the lower sole, and wherein the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion.

De Beaucourt et al shows an upper sole and a lower sole (Col 2, lines 3 – 33, lower part 11, upper part 13; See Fig 1); the lower sole is provided with side wall rising upward at a part next to the outer edge of the foot portion (Col 2, lines 3 – 33, lower part 11, upper part 13; See

Fig 1); Nishikawa et la shows the force sensor is provided between the upper sole and the lower sole (Col 6,lines 50- 65; See Fig 2, Upper Surface 62, Lower sole 54, Sensor 50)

It would have been obvious for one of ordinary skill in the art to provide the robot foot structure of De Beaucourt, along with sensor of Nishikawa, in order to provide improved foot bearing action, with improved foot stability, as taught by De Beaucourt and Nishikawa, to Takenaka.

As for claim 10, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and at least a part of a outer edge of the sole as a detection part of the corresponding force sensor (Fig 5; Col 5, lines 40-45), in the region next to the end edges of the respective soles (Fig 5, Col 5, lines 40 - Col 6, lines 35), forms a circular arc plane with the force sensor as the center (Fig 5, Col 5, lines 40 - Col 6, lines 35 where the circular arch plane is the robotic feet with sensor distributed around the feet including center).

As for claim 11, Takenaka et al shows the force sensor is a 3-axis force sensor (Fig 2, Six dimensional force and torque sensor 36; Col 3, lines 35 - 55), and the compensation part comprises a hexaxial force computing part for computing forces in the hexaxial direction based on detected signals from respective force sensors (Fig 4, E0, E1,E2 coordinates, X,Y,Z directions; Col 4 lines 35 - Col 5, lines 43), and a contact detection part for detecting the contact of a foot side by a decomposition of force components (Fig 5, dx dy; Col 5 4- 34).

As for claim 12, Takenaka et al shows the contact detection part judges if the detected signals from respective force sensors are forces from a floor surface, or by the contact to a matter on the floor surface (Fig 4, Fig 5; Col 5, lines 5 - 35), and outputs flag information as to which force sensor detected the contact of a foot side to the compensation part (Fig 5; Col 1, lines 23 - 40 where convex polygon is distributed by force sensors, which connects to the control unit 26; Col 3, lines 59 - Col 4, lines 10).

Response to Arguments

1. Applicant's remark filed on September 24^{th}, 209 have been fully considered and reviewed but they are not particularly persuasive.

2. In response to applicant's remark that the prior art reference does not show detect a contact of foot sides to an obstacle while the foot portion is moved. Applicant's attention is directed to Takenaka et al, where Takenaka shows a six dimensional force sensor installed on the foot portion, where the external force exerted on the foot portion in x, y and z direction will be detected, such as contact force. Applicant's attention is also further directed to De Beaucourt et al, where the primary design and usage of De Beaucourt et al is for the contact force exerted on the robot foot sole. Further, applicant states Takenaka describes that the convention design for detecting whether or not the foot is in contact with the ground, However, one feature that explicitly stated on Takenaka does not necessarily prevent the by default feature and fundamental capability of Takenaka for detecting the contact force next to the end edge exerted on foot sole of Takenaka since Takenaka not only equipped on the means for detecting the

contact force with the ground but also capable for detecting contact force to the end edge using six dimensional sensor in x, y and z direction.

3. In response to applicant's remark that the prior art reference does not show gait forming part so as to maintain a robot's stability. Applicant is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, and then it meets the claim.

4. In response to applicant's remark that the prior art reference does not show applicant's application as exhibited and demonstrated on applicant's specification on Paragraph 0006, 0016. It is noted that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IAN JEN whose telephone number is (571)270-3274. The examiner can normally be reached on Monday - Friday 9:00-6:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Khoi Tran can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ian Jen/
Examiner, Art Unit 3664
/KHOI TRAN/

Supervisory Patent Examiner, Art Unit 3664